

Stimulus funds boost musculoskeletal research

By Annie Hayashi

More than \$10 billion in ARRA money allocated to NIH

When the American Recovery and Reinvestment Act (ARRA) was signed into law earlier this year, the stimulus money was frequently associated with job creation in construction and other “shovel-ready projects.” But the nation’s infrastructure isn’t the only area targeted for improvement; biomedical research is also getting a shot in the arm.



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The National Institutes of Health (NIH) received more than \$10.4 billion in ARRA funds to accelerate biomedical research. Of that amount, \$8.2 billion has been allocated for “extramural scientific research”—research conducted outside of the NIH.

“We are probably never going to see anything like this again. Not only will these funds create and preserve research jobs but they will enable the launch of novel research projects that will have a real impact,” said Robert H. Carter, MD, deputy director, National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS).

ARRA boon for orthopaedic research

After a number of years without any increases in funding, orthopaedic research has gotten a boost from the ARRA.

Some of these funds will be used for projects that were previously deemed to be meritorious by

the NIH/NIAMS but could not be funded due to lack of money. The research projects range from basic science to surgical skills training.

For example, ARRA monies will be used to fund a project at Boston's Brigham and Women's Hospital to evaluate the impact of simulator training on the arthroscopy skills of orthopaedic residents. ARRA funds will enable researchers at Indiana University-Purdue University at Indianapolis to analyze the genetic causes of bone fragility, particularly at the femoral neck. And at the University of Utah, orthopaedic hip implant materials—specifically ceramic and polyethylene bearings—will be tested for two types of edge loading to improve the next generation of implants.

Tackling tough orthopaedic problems

ARRA funds will also be used to support research on orthopaedic challenges, such as segmental bone defects. Left untreated, these bone defects can become nonunions.

Amarjit S. Viridi, PhD, an assistant professor at Chicago's Rush University Medical Center, is investigating whether adding low-intensity pulsed ultrasound (LIPUS) to recombinant human bone morphogenetic protein-2 (rhBMP-2) will accelerate healing in larger segmental bone defects so better treatment protocols can be developed to improve bone healing.

Dr. Viridi and his colleagues had successfully demonstrated that LIPUS used with rhBMP-2 hastened ectopic bone formation in a rat model. Their continuing research will test the synergistic effect of LIPUS and rhBMP-2 on more challenging and clinically relevant segmental bone defects.

"Our first aim was to determine the optimal dose of rhBMP-2 to produce 100 percent healing," said Dr. Viridi. "Once that optimal dose is established, we can use the LIPUS to accelerate the healing process.

"In a clinical situation, we would use the optimum dose of rhBMP-2 together with LIPUS to further accelerate healing so return to function is faster," he said.

The investigators will also test the overall efficacy of using a suboptimum dose of rhBMP-2—1/10 of the optimum dose—with LIPUS. Using a suboptimum dose would provide a much less expensive alternative as well as having fewer side effects.

"From a scientific point of view, we also want to know which phase of the bone repair is the most responsive to LIPUS," Dr. Viridi explained.

"The rhBMP-2 is delivered when the defect occurs. We have no way of controlling the involvement of the rhBMP-2 in subsequent events from that point. We can, however, determine the optimal times when LIPUS should be used," he said.

The investigators will use bone volume as measured by micro computed tomography and mechanical strength as the primary endpoints for this study.

"Opening up this kind of investigation will give patients and physicians more options for treating difficult and challenging clinical situations," said Dr. Viridi. "We hope it will enable better, faster healing."

NIH creates jobs, promotes novel research

With ARRA funds, the NIH has established several innovative programs that generate employment opportunities. "Core Centers for Enhancing Research Capacity at U.S. Academic Institutions," an NIH-sponsored program, supports new faculty members.

"The Core Center grants are designed to establish innovative programs of excellence by providing scientific and programmatic support for research by promising investigators," said Raynard S. Kington, MD, PhD, deputy director, NIH.

To promote interest in research careers, summer educational opportunities in NIH-funded institutions were available to high school and college students. Summer internships at NIH-funded laboratories were also offered to elementary, secondary, and community college school science educators.

According to Dr. Kington, two new grant programs—Challenge Grants and Grand Opportunity (GO) grants—have been developed to "jump start biomedical research or to overcome specific scientific challenges."

"The Challenge Grant program is designed to spur new areas of research and trigger an influx of research dollars into communities across the nation," he said.

"The NIH requested applications for Challenge Grants on topics in 15 broad scientific areas where the agency believes significant progress could be made within the 2-year timeframe designated for this grant," said Dr. Carter.

These areas included bioethics, translational science, genomics, stem cells, enhancing clinical trials, enabling technologies, and regenerative medicine. Each Challenge Grant can be funded up to \$500,000 in total costs per year for a maximum of 2 years. The NIH plans to invest \$200 million in Challenge Grants.

By June 2009, the NIH had received approximately 20,000 applications for Challenge Grants—the same number of applications that the NIH receives in one of their annual three major review rounds.

The GO grants are for larger budget projects—providing approximately \$500,000 for total costs per year for a maximum of two years. By August 2009, more than 2,500 applications had been received for GO grants. "Instead of the NIH determining the topic areas for the Grand Opportunity GO Grants," Dr. Carter explained, "we asked the research community to tell us what they thought were important topic areas."

"The purpose of the GO grant program is to support high impact ideas that require significant resources for a discrete period of time to lay the foundation for new fields of investigation," explained Dr. Kington.

An ARRA-funded grant program called "Competing Revisions" is intended to support new research initiatives outside of the initial grant application. "The investigator is proposing new science that was different than was initially reviewed," said Dr. Carter.

"The Administrative Supplement grant must be within the scope and aims of the original award but can introduce a new technique for achieving an aim or add a staff member to accelerate the pace of the program," he continued.

Grantees for all ARRA funding are subject to an unprecedented level of accountability, including detailed quarterly budgeting reports, a summary of funds received, and a list of expenditures. An estimate of the number of jobs created and retained through the grants' projects and activities must also be included. All reports will be publicly available at www.recovery.gov

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